

# Exhibit 827-2

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*Technical Specification*

## **3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture (Release 9)**



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NOTE 2: In addition, the GW may maintain IP-CAN bearer level measurement if required by the operator.

The PCEF shall support volume measurement for an IP-CAN session and maintain a measurement for each IP-CAN session for which the PCRF has requested the Usage report trigger and provided threshold values on an IP-CAN session level.

The PCEF shall support volume measurement per Monitoring key and maintain a measurement for each Monitoring key if the PCRF has requested the Usage report trigger and provided threshold values on Monitoring key level.

The PCEF shall support simultaneous volume measurement for usage monitoring on IP-CAN session level and Monitoring key level for the same IP-CAN session.

Volume measurements for usage monitoring purposes on IP-CAN session level and on Monitoring key level shall be performed independently of each other.

If the Usage report reached event trigger is set and a volume threshold is reached, the PCEF shall report this event to the PCRF. The PCEF shall continue to perform volume measurement after the threshold is reached and before a new threshold is provided by the PCRF. At IP-CAN session termination or if the conditions defined in clause 6.6.2 for continued monitoring are no longer met, or if the PCRF explicitly requests a usage report, the PCEF shall inform the PCRF about the resources that have been consumed by the user since the last usage report for the affected Monitoring keys.

If a Usage thresholds for a Monitoring key is not provided to the PCEF in the acknowledgement of an IP-CAN Session modification where its usage was reported, then usage monitoring shall not continue in the PCEF for that Monitoring key.

#### 6.2.2.4 QoS control

The PCEF enforces the authorized QoS for an IP-CAN bearer according to the information received via the Gx interface and depending on the bearer establishment mode.

Only the GBR per bearer is used for resource reservation (e.g. admission control in the RAN). The MBR (per PCC rule / per bearer) is used for rate policing.

For a UE-initiated IP-CAN bearer establishment or modification the PCEF receives the authorized QoS (QCI, ARP, GBR, MBR) for a bearer that the PCEF has identified for the PCRF. The PCEF shall enforce it which may lead to a downgrading or upgrading of the requested bearer QoS.

For a network initiated IP-CAN bearer establishment or modification the PCEF receives the authorized QoS per PCC rule (QCI, ARP, GBR, MBR). For GBR bearers the PCEF should set the bearer's GBR to the sum of the GBRs of all PCC rules that are active and bound to that GBR bearer. For GBR bearers the PCEF should set the bearer's MBR to the sum of the MBRs of all PCC rules that are active and bound to that GBR bearer.

For an IP-CAN that supports non-GBR bearers that have a separate MBR (e.g. GPRS) the PCEF may, before or in connection with activation of the first PCC rule with a certain QCI, receive the authorized QoS (QCI, MBR) for that QCI. The authorized MBR per QCI only applies to non-GBR bearers, and it sets an upper limit for the MBR that the PCEF assigns to a non-GBR bearer with that QCI. In case multiple IP-CAN bearers within the same IP-CAN session are assigned the same QCI, the authorized MBR per QCI applies independently to each of those IP-CAN bearers. The PCRF may change the authorized MBR per QCI at any time. An authorized GBR per QCI shall not be signalled on Gx.

NOTE: The intention of the authorized MBR per QCI is to avoid frequent IP-CAN bearer modifications as PCC rules are dynamically activated and deactivated. That is, the PCEF may choose to assign the authorized MBR per QCI to a non-GBR bearer with that QCI.

### 6.2.3 Application Function (AF)

The Application Function (AF) is an element offering applications that require dynamic policy and/or charging control over the IP-CAN user plane behaviour. The AF shall communicate with the PCRF to transfer dynamic session information, required for PCRF decisions as well as to receive IP-CAN specific information and notifications about IP-CAN bearer level events. One example of an AF is the P-CSCF of the IM CN subsystem.

The AF may receive an indication that the service information is not accepted by the PCRF together with service information that the PCRF would accept. In that case, the AF rejects the service establishment towards the UE. If possible the AF forwards the service information to the UE that the PCRF would accept.

An AF may communicate with multiple PCRFs. The AF shall contact the appropriate PCRF based on either:

- the end user IP Address; and/or
- a UE identity that the AF is aware of.

NOTE 1: By using the end user IP address, an AF is not required to acquire any UE identity in order to provide information, for a specific user, to the PCRF.

In case of private IP address being used for the end user, the AF may send additional PDN information (e.g. PDN ID) over the Rx interface. This PDN information is used by the PCRF for session binding, and it is also used to help selecting the correct PCRF.

For certain events related to policy control, the AF shall be able to give instructions to the PCRF to act on its own, i.e. based on the service information currently available as described in clause 6.1.5.

The AF may use the IP-CAN bearer level information in the AF session signalling or to adjust the IP-CAN bearer level event reporting.

The AF may request the PCRF to report on IP-CAN bearer level events (e.g. the signalling path status for the AF session). The AF shall cancel the request when the AF ceases handling the user.

NOTE 2: The QoS authorization based on incomplete service information is required for e.g. IMS session setup scenarios with available resources on originating side and a need for resource reservation on terminating side.

The AF may request the PCRF to report on the change of type of IP-CAN. In the case of 3GPP IP-CAN, the information of the Radio Access Technology Type (e.g. UTRAN) and the change thereof shall be also reported to the AF, even if the IP-CAN type is unchanged.

NOTE 3: The H-PCRF informs the AF of event triggers that cannot be reported. For detail see Annex L.

## 6.2.4 Subscription Profile Repository (SPR)

The SPR logical entity contains all subscriber/subscription related information needed for subscription-based policies and IP-CAN bearer level PCC rules by the PCRF. The SPR may be combined with or distributed across other databases in the operator's network, but those functional elements and their requirements for the SPR are out of scope of this document.

NOTE: The SPR's relation to existing subscriber databases is not specified in this Release.

The SPR may provide the following subscription profile information (per PDN, which is identified by the PDN identifier):

- Subscriber's allowed services;
- For each allowed service, a pre-emption priority;
- Information on subscriber's allowed QoS, including the Subscribed Guaranteed Bandwidth QoS;
- Subscriber's charging related information (e.g. location information relevant for charging);
- Subscriber's User CSG Information reporting rules;
- Subscriber category;
- Subscriber's usage monitoring related information.

## 6.2.5 Service Data Flow Based Credit Control Function

The Service Data Flow Based Credit Control Function performs online credit control functions. It is a functional entity within the Online Charging System.

The Online Charging System is specified in TS 32.240 [3].

The OCS may trigger the PCEF to initiate a IP-CAN bearer service termination at any point in time.

NOTE: As the OCS performs the credit control per charging key basis (and thus has not necessarily the knowledge about the existence of any specific service data flow), it is recommended to use different charging keys for any service data flows that shall not be unintentionally interrupted.

There may be several OCSs in a PLMN. The default OCS addresses (i.e. the primary address and secondary address) shall be locally pre-configured within the PCEF. OCS addresses may also be passed once per IP-CAN session from the PCRF to the PCEF. The OCS addresses provided by the PCRF shall have a higher priority than the pre-configured ones.

## 6.2.6 Offline Charging System (OFCS)

The Offline Charging System is specified in TS 32.240 [3].

There may be several OFCSs in a PLMN. The default OFCS addresses (i.e. the primary address and secondary address) shall be locally pre-configured within the PCEF. OFCS addresses may also be passed once per IP-CAN session from the PCRF to the PCEF. The addresses provided by the PCRF shall have a higher priority than the pre-configured ones.

## 6.2.7 Bearer Binding and Event Reporting Function (BBERF)

### 6.2.7.1 General

The BBERF includes the following functionalities:

- Bearer binding.
- Uplink bearer binding verification.
- Event reporting to the PCRF.
- Sending or receiving IP-CAN-specific parameters, to or from the PCRF.

### 6.2.7.2 Service data flow detection

The service data flow detection at the BBERF is identical to the detection at PCEF with the following modifications:

- If the service data flow is tunnelled at the BBERF, the BBERF uses information on the mobility protocol tunnelling header provided by the PCRF and the QoS rules to detect the service data flows.

For the uplink direction, the BBERF applies QoS rules with a bearer binding to the bearer that the packet arrived on. The uplink bearer binding verification is successful if there is a QoS rule with a matching uplink SDF filter. The BBERF shall discard packets for which the uplink bearer binding verification fails.

### 6.2.7.3 QoS Control

The ARP, GBR, MBR and QCI are used by the BBERF in the same way as in the PCEF for resource reservation.

When access network is not utilizing QCI based QoS parameters, the BBERF shall be able to convert a QoS class identifier value to QoS attribute values used in the access network and determine the QoS class identifier value from a set of QoS attribute values used in the access network.

NOTE: The definition of the mapping between QCI and Non 3GPP access specific QoS is outside of scope for 3GPP.